ON A PECULIAR MONSTROSITY IN A FROG.

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About three years ago a student, Mr. F. L. Conover, brought me a remarkable specimen of *Rana pipiens*, which he had found among the specimens at the biological laboratory of the Madison High School. The frog was alive. It measured fifty-two millimeters body length and was apparently in full vigor, its death being caused by an overheating of my office at a time when I had to be unexpectedly absent for several days.

The remarkable character of this specimen consists in the presence of three extra limbs extending caudad from the region of the sternum, two on the right and one on the left side. It is very evident that they are attached to an extra basal piece overlying the sternum. All three are more or less imperfect, so that I find it impossible to determine whether they represent arms or legs, or both. Each has four malformed digits, and each shows a thickening indicating the location of the joint between the proximal and distal parts of the limb, the elbow or knee. All are pigmented on the surface away from the frog, with no pigment on the opposite surface. The accompanying photograph (Fig. 2) and radiograph (Fig. 1) of the specimen illustrate better than any verbal description the actual conditions present.

Monstrosities in nature involving the hind legs are not uncommon in the frog, but those involving the fore limbs are apparently rare. The only one known to me is one figured by Sutton ('92, p. 112, Fig. 60), involving the presence of an extra leg on the left side. There is a case in the human being, often quoted, shown in Fig. 3; I have been told about another closely similar case exhibited in this country several years ago, but I have not been able to get exact information concerning it.

Dr. F. R. Lillie kindly called my attention to a very important paper by Tornier (:05) which I would otherwise have overlooked.

Tornier, by an ingeniously chosen cut, separated the upper one quarter or so of the Anlagen of both hind limbs in *Pelobates*. The result was in several cases, at least, the formation of the

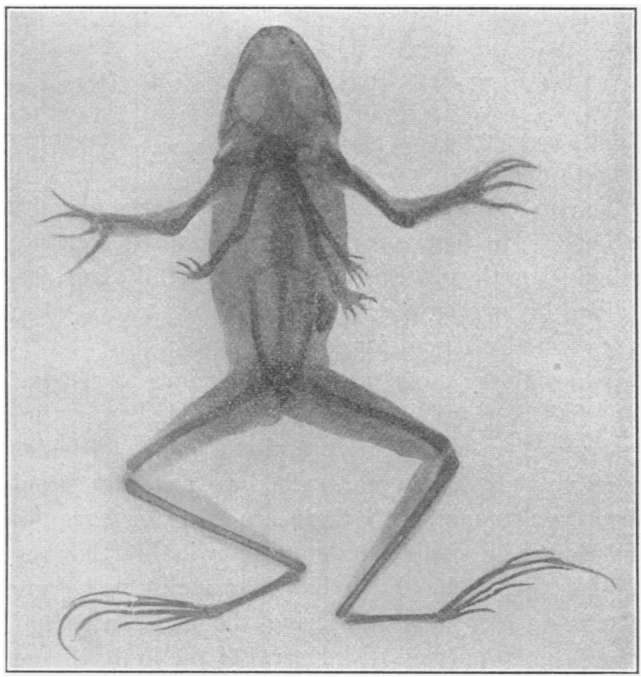

FIG. 1.

normal pairs of limbs *plus* two complete extra girdles each with a pair of limbs. Less completely successful experiments resulted in fewer and less fully formed supernumerary parts. But the monstrosities in all cases resembled closely those found in nature, and the close approximation and exposed situation of the Anlagen of the two hind limbs make accidents in nature which may be compared with this artificial "accident" at least not improbable. Tornier's work, it seems to me, gives us a very satisfactory explanation of such forms.

Is it equally applicable to the forelimbs? The location of the Anlagen under the opercle makes experimentation here much more difficult, and no such experiments have been carried out,

so far as I know. One might expect that by operating on one of the Anlagen a supernumerary arm, such as that of Sutton's case, could be produced. It is an experiment that some skilful operator should attempt to perform. But the Anlagen of the two limbs are here not closely approximated; they are far apart. A simultaneous operation on both is not possible, and an accident in nature equally affecting both is in the highest degree improbable.

It appears much more probable to me that in the frog here described we have a case quite parallel to that in Fig. 3, which is

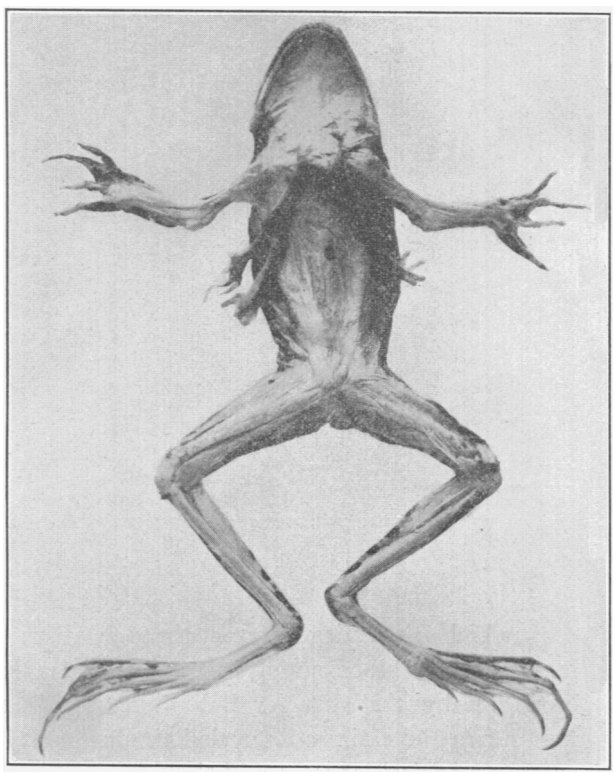

FIG. 2.

properly designated, according to Schwalbe ('07), as a *Thoracopagus parasiticus*. The generally accepted, and to me very probable, explanation of these forms is that they started with a

monstrosity consisting of two complete embryos united at the breast bone. For some reason or other one gains a start in development. As their circulatory systems are united (as is believed, and in many cases demonstrated) this stronger individual (autosite) soon drives its blood into the other (parasite),

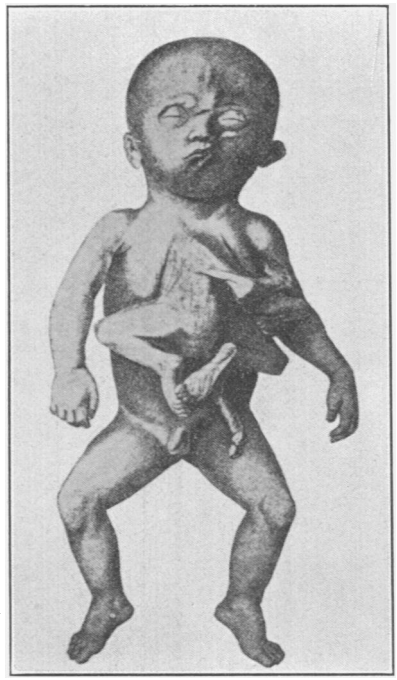

FIG. 3. (After Adami, after Wintersohn.)

the heart of which then degenerates through disuse. This means a less adequate blood supply, atrophy, and a lesser or greater absorption by the stronger individual. It is easy to see that the later in the embryonic period the inequality begins the more extensive in development will the parasite be.

I have not attempted to seek all the cases of this sort in man. Approximate parallels of that shown in Fig. 3 must be, to judge from the literature, quite rare. As to the lower vertebrates I have not been able to find a record of any case closely similar to this. It is an interesting fact to note that a frog could grow

to maturity with so very material an impediment. It makes one ask just how much of a variation from the normal is needed to enable natural selection to perform its cruel work?

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